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SECTION 1.0
INTRODUCTION

This Air Quality Monitoring Report presents a summary of air quality monitoring conducted by Atlantic Richfield Company ("ARC") at the Yerington Mine Site during the second quarter of 2006 ("2Q 2006"). Monitoring activities were conducted according to the *Draft Air Quality Monitoring Work Plan for the Yerington Mine Site* ("Work Plan") dated December 22, 2004 (Brown and Caldwell, 2004a) and conditionally approved by the U.S. Environmental Protection Agency ("EPA") on January 19, 2005. A final version of the Work Plan was submitted to EPA on December 19, 2005 (Brown and Caldwell, 2005a). Air quality monitoring was conducted on the National Ambient Air Quality Standards ("NAAQS") monitoring schedule, which consists of sampling on every sixth day.

Air quality monitoring was conducted at six locations located around the perimeter of the site (AM-1 through AM-6, shown on Figure 1). Each location was established to assess potential fugitive dust emissions from the site and monitor: 1) particulate matter of a diameter of 10 microns or less (PM_{10}) with a high volume sampler; 2) total suspended particulates ("TSP") with a separate high volume air sampler; and 3) concentrations of selected metals and radiochemicals collected on the PM_{10} and TSP filters. Monitoring location AM-1 was established with a second PM_{10} high volume air sampler, co-located with the primary sampler, for duplicate analyses. Monitoring location AM-6 was sited near the site meteorological station.

SECTION 2.0
FIELD ACTIVITIES

Field activities during 2Q 2006 consisted of calibration, auditing, monitoring, and maintenance. A summary of these activities is presented in Table 1. Field activities were conducted according to Standard Operating Procedures ("SOPs") provided in the Work Plan, the *Quality Assurance Project Plan, Yerington Mine Site* (Brown and Caldwell, 2003) and the revised *Site Health and Safety Plan* (Brown and Caldwell, 2005b).

2.1 Calibration

Calibration activities consisted of quarterly calibration of the high volume air samplers. Semi-annual calibration for the meteorological station is planned for early in the following quarter.

2.1.1 High Volume Air Sampler Calibration

The Work Plan specified that the high volume air samplers would be calibrated according to the following schedule:

- Upon installation;
- After any motor maintenance;
- Once every quarter (3 months); and
- After 360 hours.

All PM_{10} and TSP high volume air samplers were recalibrated during April 5 to 7, 2006 and during June 13 to 14, 2006 following routine motor maintenance.

The Work Plan specified a minimum of five calibration points for all high volume samplers. In addition, three calibration points must be within 1.02 to 1.24 cubic meters per minute (m^3/min) for the PM_{10} high volume air samplers. The Work Plan also specified a calibration correlation coefficient greater than 0.99 for all high volume samplers. The calibration data sheets and charts for each high volume air sampler are provided in Appendix A for the June 13 to 14, 2006

calibration event. The calibration data sheets and charts for the April 5 to 7, 2006 calibration event were included with the 1Q 2006 air quality monitoring report. All calibration requirements were achieved.

2.1.2 Meteorological Station Calibration

The Work Plan specified that the calibration of the meteorological station would be conducted at the start of the program and on a semi-annual basis thereafter. The semi-annual calibration is planned for early in the following quarter.

2.2 Auditing

The EPA representative conducted an audit during January 9 to 10, 2006 that consisted of:

- Evaluation of high volume air sampler operations, filter handling, and filter preparation/removal, and documentation; and
- EPA and manufacturer-approved audit of high volume air samplers.

The audit report was not available for the 1Q 2006 air quality monitoring report, but is included in this report as Appendix B. The results of the audit are summarized below.

- All PM_{10} and TSP samplers audited on January 9 through 10, 2006, successfully passed all audit criteria. No equipment failures, leaks, or anomalies were observed during the audit procedure.
- At the time of the meteorological tower audit on January 10, 2006, all sensors were operating within PSD-audit criteria. During the previous audit, a damaged precipitation gauge wire was identified. The damaged wire was observed to be replaced with a new wire and was operating correctly at the time of the audit.

The EPA representative recommended the following activities summarized below.

- Continue to perform scheduled bi-weekly site visits to the meteorological tower to download data and visually inspect the sensors.
- In addition, downloaded data should be screened and evaluated within 48 hours to identify problems and minimize loss of data.

2.3 Monitoring

Monitoring activity consisted of air monitoring and meteorological monitoring, as described below.

2.3.1 Air Monitoring

The Work Plan specified that air monitoring would be conducted according to the NAAQS monitoring schedule for PM_{10}. Air monitoring during 2Q 2006 was conducted every sixth day beginning with Event 74 on April 11, 2006 through Event 87 on June 28, 2006 for a total of 14 events. Event 73 on April 5, 2006 was cancelled due to quarterly maintenance as explained below. Field data sheets and total volume calculations are provided in Appendix C.

Sample volumes were calculated using the average daily temperature and barometric pressure from the meteorological station, and calibration chart slopes and intercepts as specified in the *Reference Method for the Determination of Particulate Matter as PM-10 in the Atmosphere* (EPA, 1998a) and the *Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-Volume Method)* (EPA, 1998b). The sample volumes for PM_{10} and TSP samples are summarized in Tables 2 and 3, respectively. The following are notable occurrences for the air monitoring during this reporting period.

- Event 73 on April 5, 2006 was cancelled due to regularly scheduled quarterly maintenance and re-calibration.
- During Event 75 on April 17, 2006, Dickson charts were omitted at high volume air samplers AM-1-PM10-DUP and AM-1-TSP. Sample volumes could not be determined; therefore, these samples were not submitted for analysis.
- During Event 80 on May 17, 2006, the timer malfunctioned at high volume air sampler AM-4-PM10 for an unknown reason. The unit ran for approximately 34 hours which exceeded the acceptable sample duration range of 23 to 25 hours specified in the method. The sample was considered invalid and was not submitted for analysis.
- During Event 81 on May 23, 2006, the timers malfunctioned at high volume air samplers AM-3-TSP and AM-4-TSP for unknown reasons. Both units failed to turn on and valid samples were not collected.

2.3.2 Meteorological Monitoring

Meteorological monitoring was conducted with the meteorological station during 2Q 2006. The following parameters were measured:

- Precipitation in inches;
- Temperature in degrees Fahrenheit (°F);
- Relative humidity in percent;
- Barometric pressure in milliBars (mBar);
- Solar radiation in kiloJoules per square meter (kJ/m^2);
- Wind speed in miles per hour (mph); and
- Wind direction in degrees.

Meteorological data was collected from the station at 15-minute intervals from April 1, 2006 to June 30, 2006. Selected meteorological data is summarized on Table 4 for monitoring events during this reporting period.

2.4 Maintenance

Maintenance activity consisted of troubleshooting, part replacement, and routine maintenance on the high volume air samplers and routine maintenance and part replacement on the meteorological station.

2.4.1 High Volume Air Sampler

During Event 80 on May 17, 2006 and Event 81 on May 23, 2006, the timers malfunctioned on three different high volume air samplers for unknown reasons. The malfunctions did not recur during the remainder of the events in the quarter; therefore, no obvious maintenance or repair was prescribed. Minor routine maintenance included the replacement of recorder pens for the Dickson chart recorders and re-greasing of shim plates on the PM_{10} high volume air samplers.

The Work Plan specified that motor brushes would be checked or replaced every 300 to 500 hours of operation. Cumulative operational hours for each blower motor are provided electronically on compact disc in Adobe Acrobat portable document format ("PDF") in

Appendix D. After the completion of Event 84 on June 10, 2006, all of the motors for PM_{10} high volume air samplers had accumulated between 264 and 274 hours of operation. After the completion of Event 84, all of the motors for TSP high volume air samplers had accumulated between 240 and 264 hours of operation. All motors in the PM_{10} and TSP high volume air samplers were replaced on June 12, 2006.

2.4.2 Meteorological Station

Routine maintenance conducted on the meteorological station during this reporting period consisted of ensuring that the tipping bucket was aligned to vertical.

SECTION 3.0
AIR QUALITY DATA VERIFICATION AND VALIDATION

Severn Trent Laboratories performed the gravimetric analyses of PM_{10} and TSP filters, and chemical analysis of metals and radiochemicals present on both PM_{10} and TSP filters for Event 74 on April 11, 2006 through Event 87 on June 28, 2006. Analytical results were provided by the laboratory electronically in a format specified by Brown and Caldwell. The laboratory electronic data deliverables ("EDDs") were uploaded automatically into the project database, which consists of a Microsoft SQL Server database with a Microsoft Access user interface. The analytical results are provided electronically on compact disc in Microsoft Excel format in Appendix E. The laboratory reports are provided electronically on compact disc in Adobe Acrobat PDF in Appendix F.

3.1 Data Verification

All air quality data was verified according to the quality control ("QC") criteria provided in the Work Plan. The items listed in the following table were verified for analytical data.

Data Verification Requirements	
Review Item	**Checked During Data Verification**
Case Narrative	X
Chain-of-Custody Documentation	X
Summary of Results	X
Holding Times	X
Method Blank Analysis Results	X
Field/Trip Blank Analysis Results	X
Surrogate Standard Percent Recoveries (%R)	X
Laboratory Control Samples (LCS) - %R	X
LCS/LCS Duplicate (LCSD) - Relative Percent Difference (RPD)	X
Field Duplicate (FD) - RPD	X

A detailed QC report is provided for the 2Q 2006 in Appendix G. In summary, the verification indicates that the majority of analytical data generated during 2Q 2006 are usable with no data rejected. Notable findings from the QC report are provided below:

- Data Completeness: The Work Plan specified a data completeness goal of quarterly valid data retrieval of 80 percent for air quality data. The completeness goal was to be tracked for each of the six monitoring locations (AM-1 through AM-6). If one or more of the high volume air samplers malfunctioned during a sampling event, such that valid data could not be retrieved, then a makeup run could be conducted on the immediately following 3-day event specified in the NAAQS schedule. Fourteen sampling events were conducted during 2Q 2006, as summarized in Table 5. There were several exceptions to the sampling and analysis plan this reporting period. Event 73 on April 5, 2006 was cancelled due to quarterly maintenance. During Event 75 on April 17, 2006, the Dickson chart was omitted at AM-1-TSP. Since the sample volume could not be determined, the sample was not submitted for analysis. During Event 80 on May 17, 2006, the timer malfunctioned at AM-4-PM10 and a valid sample was not collected. During Event 81 on May 23, 2006, the timers malfunctioned at AM-3-TSP and AM-4-TSP and valid samples were not collected. A total of 164 primary samples were collected out of 180 planned. The actual completeness for air quality data was calculated to be 91 percent, which exceeds the 80 percent program goal.
- Sample Hold Time: All the samples were analyzed within the hold time.
- Field Duplicates: The Work Plan specified a collection frequency goal of 10 percent for field duplicates, which were collected for every event. The total number of primary samples targeted during this reporting period was 180. A total of 13 field duplicate samples were collected. The actual frequency of field duplicate collection was 7.2 percent, which is below the program goal of 10 percent; however, the EPA and ARC agreed that only one high volume sampler would be co-located for duplicate analysis. Field duplicate precision for metals and radiochemicals are provided in Table 6.
- Field Blanks and Trip Blanks: The Work Plan specified a collection frequency goal of 5 percent for field blanks and 5 percent for trip blanks. Twelve field blanks and eleven trip blanks were collected during this reporting period as shown on Tables 7a and 7b. The total number of primary samples targeted during this reporting period was 180. The actual frequency of field blank collection was 6.6 percent which exceeds the program goal of 5 percent. The actual frequency of trip blank collection was 6.1 percent which exceeds the program goal of 5 percent. A total of 385 results were qualified as not detected with an estimated detection limit due to the presence of iron, mercury, vanadium, radium-228 and thorium-230 in associated field/trip blanks as described in Appendix G. It is worth noting that out of the 23 trip/field blanks, 21 had contamination from iron, 17 had mercury, 12 had thorium-230, 10 had vanadium and 9 had radium-228. Field procedures for sample handling were reviewed, and no sample collection issues were identified.
- Method Blanks: A total of 218 results were qualified as not detected with an estimated detection limit due to the presence of mercury, vanadium, radium-228 and thorium-230 in associated method blanks as described in Appendix G.

3.2 Data Validation

The Work Plan specified that 10 percent of the air quality data would be validated by a third party. The data validation reports are provided electronically on compact disc in Adobe Acrobat PDF in Appendix H. The data verification requirement was mainly concerned with metals and radiological analyses since gravimetric analytical methods specify minimal QC. Third party data validation is being conducted by Veridian Environmental and ESI for the Sample Delivery Groups ("SDGs") associated with the monitoring events indicated below.

Status of Third Party Data Validation

Event	SDGs	Chemical Analyses	Report Date	Validator	Location
3	G5H260309	Metals	11/2/05 3/31/06 Revision A	Veridian	3Q 2005 Report 2Q 2006 Report
3	30354	Radiochemicals	4/3/06	ESI	2Q 2006 Report
13	G5H260363	Metals	11/2/05 3/31/06 Revision A	Veridian	3Q 2005 Report 2Q 2006 Report
13	30401	Radiochemicals	4/12/06	ESI	2Q 2006 Report
23	G5F170169 & G5F170175	Metals	8/31/05 3/31/06 Revision A	Veridian	3Q 2005 Report 2Q 2006 Report
23	29297	Radiochemicals	3/31/06	ESI	2Q 2006 Report
33	G5H100234	Metals	10/25/05 1/18/06 Revision A 3/31/06 Revision B	Veridian	3Q 2005 Report 4Q 2005 Report 2Q 2006 Report
33	30037	Radiochemicals	3/31/06	ESI	2Q 2006 Report
43	G5J120301	Metals	1/17/06 3/31/06 Revision A	Veridian	4Q 2005 Report 2Q 2006 Report
43	31081	Radiochemicals	4/6/06	ESI	2Q 2006 Report
53	G5L090197	Metals	3/2/06	Veridian	4Q 2005 Report
53	31489	Radiochemicals	4/27/06	ESI	2Q 2006 Report
63	G6B140190	Metals	4/6/06	ESI	2Q 2006 Report
63	32013	Radiochemicals	6/28/06	ESI	2Q 2006 Report
74	G6D190170	Metals	9/5/06	ESI	2Q 2006 Report
74	32362	Radiochemicals	In progress	ESI	---
83	32815	Radiochemicals	8/22/06	ESI	2Q 2006 Report
84	G6F190128	Metals	8/24/06	ESI	2Q 2006 Report

SECTION 4.0
METEOROLOGICAL DATA VALIDATION

Meteorological data was downloaded electronically from the meteorological station on approximately a weekly basis. The electronic files were uploaded automatically into the project database. The complete meteorological data are provided electronically on compact disc in Microsoft Excel format in Appendix I.

All meteorological data were validated according to the criteria provided in the Work Plan. The validation routines were programmed in Microsoft Visual Basic and incorporated into the Microsoft Access database as modules that can be run on a selected date range. The validation results are provided in the following sections for data completeness, wind speed, wind direction, temperature, solar radiation, barometric pressure, and relative humidity. In summary, the verification indicates that the meteorological data generated during this period are usable with no records flagged as rejected.

4.1 Data Completeness

The Work Plan specified a data completeness goal of quarterly valid data retrieval of 90 percent for meteorological data. Three months of meteorological data were collected during 2Q 2006 as summarized in Table 8. A total of 8,736 data were collected out of 8,736 planned. The actual completeness for meteorological data was calculated to be 100 percent, which exceeded the program goal of 90 percent.

4.2 Wind Speed

The Work Plan specified the following three validation criteria for wind speed, which were 100-percent achieved during 2Q 2006:

- Less than zero or greater than 56 mph [25 meters per second (m/s)];
- Does not vary by more than 0.2 mph (0.1 m/s) for 3 consecutive hours; and
- Does not vary by more than 1.1 mph (0.5 m/s) for 12 consecutive hours.

4.3 Wind Direction

The Work Plan specified three validation criteria for wind direction:

- Less than zero or greater than 360°;
- Does not vary by more than 1 degree for more than 3 consecutive hours; and
- Does not vary by more than 10 degrees for 18 consecutive hours.

No wind direction records were flagged for any of the three criteria during this reporting period.

4.4 Temperature

The Work Plan specified four validation criteria for temperature, which were 100-percent achieved during 2Q 2006:

- Greater than the local record high;
- Less than the local record low;
- Greater than a 18°F (10 degrees Celsius or °C) change from the previous hour; and
- Does not vary by more than 1°F (0.5°C) for 12 consecutive hours.

The following temperature records provide high and low temperatures recorded by the meteorological station by month:

Site Temperatures Compared to Local Records

	Site Data (°F)		Local Record[1] (°F)	
2006	**High**	**Low**	**High**	**Low**
April	78.0	23.2	92	5
May	87.8	30.2	100	15
June	97.5	40.2	102	26

[1]Source: NWS/COOP Station 269229 located in Yerington, Nevada

These data include local record highs and lows from National Weather Service Cooperative Observer Program ("NWS/COOP") Station 269229 in Yerington, Nevada. No temperature records were flagged for being either greater than the local record high or less than the local record low.

4.5 Solar Radiation

The Work Plan specified the following two validation criteria for solar radiation:

- Greater Than Zero at Night: The times for sunset and sunrise were obtained for every day of the year for Yerington, Nevada from the Astronomical Applications Department of the U.S. Naval Observatory. For the purposes of evaluating this criterion, night was defined as the meteorological station measurement readings that occurred between the time for sunset and sunrise on a given day. A total of 352 records were flagged for this criterion. The majority of records (216) that were flagged were less than 1 kJ/m^2 which, given the sensitivity of the sensor, is generally considered to be zero. The remaining 136 records that were flagged (range of 1.01 to 14.52 kJ/m^2) occurred at the calculated sunrise or sunset. The solar radiation data was determined to be usable (no corrective action necessary).
- Greater Than the Maximum Possible for the Date and Latitude: The maximum possible solar radiation for the middle day of each month for Yerington, Nevada was calculated using *Evaporation, Evapotranspiration, and Climatic Data – Developments in Atmospheric Science 22* (Burman, et. al., 1994). The solar radiation measurements from the meteorological station were totaled for each day during this reporting period and compared to the maximum possible. A total of 194 records (4/15/2006 and 5/05/2006) were flagged for this criterion during this reporting period.

Maximum Solar Radiation[1] (kJ/m^2 day)	
April	27,157
May	31,061
June	32,701

4.6 Barometric Pressure

The Work Plan specified two validation criteria for barometric pressure:

- Greater than the local record high; and
- Less than the local record low.

Local record highs and lows were obtained from the Automated Weather Observing Station ("AWOS") 93102 located in Fallon Naval Air Station, Nevada. For purposes of comparison, the mean sea level pressure was estimated using a modified National Oceanic and Atmospheric Administration ("NOAA") method. No barometric pressure records were flagged for either criterion during this reporting period.

4.7 Relative Humidity

The Work Plan specified two validation criteria for relative humidity which are described below followed by a discussion of the validation results.

- Less than 30 Percent During Precipitation Events: For the purposes of evaluating this criterion, a precipitation event was defined as a precipitation reading greater than zero inches. No records were flagged for this criterion during this reporting period.
- Varies by 30 Percent of the Local Average for 24 Consecutive Hours: Local average relative humidity by month was obtained from AWOS Station 93102 located in Fallon Naval Air Station, Nevada. No records were flagged for this criterion during this reporting period.

Local Average Relative Humidity[1]	
April	40%
May	37%
June	32%

[1]Source: AWOS Station 93102 located in Fallon Naval Air Station, Nevada

SECTION 5.0
SUMMARY AND DISCUSSION OF RESULTS

This section summarizes the results of air quality analyses and meteorological monitoring. Note that background concentrations of particulate matter, metals and radiochemicals have yet to be determined, and would be required prior to a meaningful interpretation of the analytical results.

5.1 Air Quality Data

Air quality data generated during this reporting period consisted of gravimetric analysis of PM_{10} and TSP filters, and chemical analyses of metals and radiochemicals present on both PM_{10} and TSP filters. The analytical results for all 2Q 2006 are summarized in tabular format and provided in Appendix J. Note that the quantity of chemical analyses performed on the filters affects the detection limits achievable for the project since each analysis requires a portion of the total filter be sectioned for digestion. In general, the less filter area available for digestion corresponds to less of the chemical available to measure, which results in higher detection limits.

5.1.1 Gravimetric PM_{10} Results

Analytical results for PM_{10} during 2Q 2006 are summarized in Appendix J. Masses ranged from 100 to 51,200 µg. The masses detected on the PM_{10} filters were divided by the sample volumes in cubic meters in Table 2 to calculate PM_{10} concentrations in micrograms per cubic meter ($\mu g/m^3$), summarized in Table 9. As shown in the table below, PM_{10} concentrations ranged from 0.78 to 29.9 $\mu g/m^3$.

Gravimetric PM_{10} Results, 2Q 2006

Location	Total Count	Qty. of Detects	Minimum	Average	Maximum	Qty. Detects >= NAAQS
AM-1-PM10	14	14	1.74	10.73	25.84	0
AM-1-PM10-DUP	13	13	3.54	10.67	24.32	0
AM-2-PM10	14	14	2.17	11.12	29.90	0
AM-3-PM10	14	14	2.92	8.28	20.13	0
AM-4-PM10	13	13	2.85	10.93	24.55	0
AM-5-PM10	14	14	0.78	12.32	23.95	0
AM-6-PM10	14	14	1.71	12.27	25.00	0

The PM_{10} concentrations for each event in 2Q 2006 are charted on Figure 2. General observations regarding PM_{10} measurement during 2Q 2006 are described below.

- Average PM_{10} concentrations generally increased throughout the quarter at all locations.
- Average PM_{10} concentrations were relatively equal at all monitoring locations. Monitoring location AM-3 had the lowest average PM_{10} concentration of 8.28 $\mu g/m^3$ and monitoring location AM-5 had the highest average PM_{10} concentration of 12.32 $\mu g/m^3$.
- The maximum PM_{10} concentration of 29.9 $\mu g/m^3$ during 2Q 2006 occurred at AM-2-PM10 during Event 87 on June 28, 2006.

The current NAAQS primary standard for PM_{10} (50 $\mu g/m^3$) is averaged over a year at each monitoring location. NAAQS also specifies that each monitoring location have no more than one measurement per year above 150 $\mu g/m^3$ averaged over 24 hours. Average PM_{10} concentrations by monitoring location during 2Q 2006 ranged from 8.28 to 12.32 $\mu g/m^3$, which are well below the primary standard of 50 $\mu g/m^3$.

5.1.2 Gravimetric TSP Results

Analytical results for TSP during 2Q 2006 are summarized in Appendix J and ranged from 100 to 144,900 µg. The masses detected on the TSP filters were divided by the sample volumes in cubic meters in Table 3 to calculate TSP concentrations in $\mu g/m^3$, which are summarized in Table 10. As shown in the table below, TSP concentrations ranged from 6.14 to 74.58 $\mu g/m^3$.

Gravimetric TSP Results, 2Q 2006						
Location	**Total Count**	**Qty. of Detects**	**Minimum**	**Average**	**Maximum**	**Qty. Detects >= NAAQS**
AM-1-TSP	13	13	6.29	29.67	57.32	0
AM-2-TSP	14	14	6.14	26.06	62.29	0
AM-3-TSP	13	13	7.91	21.42	45.93	0
AM-4-TSP	13	13	7.99	25.52	52.85	0
AM-5-TSP	14	14	7.94	33.57	74.58	0
AM-6-PM10	14	14	7.26	28.90	49.45	0

The TSP concentrations for each event in 2Q 2006 are charted on Figure 3. General observations regarding TSP measurement during 2Q 2006 are described below.

- Average TSP concentrations generally increased throughout the quarter at all locations.
- Average TSP concentrations at monitoring location AM-1 was the second highest behind monitoring location AM-5. In previous monitoring periods, AM-1 usually has relatively low average TSP concentrations. Monitoring location AM-3 had the lowest average TSP concentration of 21.42 $\mu g/m^3$ and monitoring location AM-5 had the highest average TSP concentration of 33.57 $\mu g/m^3$.
- The maximum TSP concentration of 74.58 $\mu g/m^3$ during 2Q 2006 occurred at AM-5-TSP during Event 81 on May 23, 2006.

Prior to 1987, the NAAQS primary standard for particulate matter, measured as TSP, was set at 75 $\mu g/m^3$ averaged over a year at each monitoring location. Average TSP concentrations by monitoring location during 2Q 2006 ranged from 21.42 to 33.57 $\mu g/m^3$, which are well below the TSP primary standard of 75 $\mu g/m^3$, which was discontinued by EPA in 1987 (note that after 1987, the NAAQS primary standard for particulate matter was measured as PM_{10}).

5.1.3 Metals Results

A total of 21 metals were analyzed from PM_{10} and TSP filters by the methods indicated below.

- ICP: five metals (aluminum, calcium, iron, magnesium, and sodium) were analyzed by inductively coupled plasma ("ICP").
- ICP/MS: fifteen metals (arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc) were analyzed by inductively coupled plasma/mass spectrometry ("ICP/MS").
- CVAA: mercury was analyzed by cold vapor atomic adsorption ("CVAA").

Analytical results for metals detected on PM_{10} and TSP filters are summarized in Appendix J. The masses detected on the PM_{10} filters were divided by the sample volumes in Table 2 to calculate the metals concentrations summarized in Table 9. The masses detected on the TSP filters were divided by the sample volumes in Table 3 to calculate the metals concentrations summarized in Table 10. A summary table of each metal is provided below in alphabetical order. Analytical results are presented in nanograms/m^3 (1,000 nanograms = 1 microgram) for

ease of presentation. Non-detected results were included in the average concentration calculation by assuming the metal was present at the detection limit. This assumption will result in some averages having a high bias compared to the actual average concentration.

2Q 2006	PM-10 Filters (ng/m3)					TSP Filters (ng/m3)				
Analyte	Total Counts	Qty. of Detects	Average Concentration	Min MDL	Max Detected Concentration	Total Counts	Qty. of Detects	Average Concentration	Min MDL	Max Detected Concentration
ALUMINUM	96	91	161	13.93	410	81	81	380	19.2	1127
ARSENIC	96	6	1.08	0.64	1.48	81	13	1.06	0.89	1.8
BARIUM	96	0	N/A	11.9	N/A	81	0	N/A	16.4	N/A
BERYLLIUM	96	27	0.006	0.003	0.015	81	43	0.013	0	0.057
CADMIUM	96	44	0.038	0.01	0.083	81	64	0.081	0.02	2.37
CALCIUM	96	23	527	307	692	81	54	670	422	1235
CHROMIUM, TOTAL	96	0	N/A	3.51	N/A	81	0	N/A	4.84	N/A
COBALT	96	1	2.1	1.26	4.02	81	3	1.98	1.73	2.95
COPPER	96	93	17	0.99	59	81	81	86.2	1.36	337
IRON	96	85	210	4.91	1076	81	75	489	6.76	2892
LEAD	96	89	1.13	0.11	3.22	81	78	1.57	0.15	4.73
MAGNESIUM	96	88	127	33.2	242	81	81	256	45.7	551
MANGANESE	96	87	7.4	0.64	21.29	81	81	15.3	0.89	45.3
MERCURY	96	20	0.028	0.001	0.006	81	28	0.035	0	0.029
MOLYBDENUM	96	2	0.62	0.37	0.771	81	5	0.617	0.51	1.92
NICKEL	96	5	2.01	1.19	3.28	81	5	1.86	1.64	2.66
SELENIUM	96	2	0.96	0.58	1.33	81	2	0.909	0.79	1.897
SILVER	96	43	0.011	0.005	0.028	81	67	0.033	0.01	0.154
SODIUM	96	7	1172	690	2105	81	14	1231	949	4729
VANADIUM	96	15	2.06	0.99	2.17	81	20	2.42	1.36	4.99
ZINC	96	49	4.3	2.11	9.14	81	67	6.16	2.91	14.2

5.1.4 Radiochemical Results

A total of 10 radiochemicals were analyzed from PM_{10} and TSP filters using the following methods for PM_{10} and TSP samples described below.

- Gas Proportional Counters: gross alpha and gross beta were analyzed by EPA Method 900.0 and radium-228 was analyzed by EPA Method 904.0.
- Alpha Scintillation Counter: radium-226 was analyzed by EPA Method 903.1.
- Alpha Spectrometry: three species of thorium (228, 230, and 232) were analyzed by Standard Method 7500-U-C and ASTM Method D-5174 and three species of uranium (234, 235, and 238) were analyzed by EPA Method 908.0.

Analytical results for the radiochemicals detected on PM_{10} and TSP filters are summarized in Appendix J. The activity values detected on the PM_{10} filters were divided by the sample volumes in Table 2 to calculate radiochemical concentrations, which are summarized in Table 11. The activity values detected on the TSP filters were divided by the sample volumes in Table 3 to calculate radiochemical concentrations, which are summarized in Table 12. A summary table of each radiochemical is provided below in alphabetical order. Analytical results are presented in femtoCuries/m^3 (1,000 femtoCuries = 1 picoCurie) for ease of presentation. Non-detected results were included in the average concentration calculation by assuming that the radiochemical was present at the detection limit. This assumption may result in some averages having a high bias compared to the actual average concentration.

2Q 2006	PM-10 Filters (fCi/m3)					TSP Filters (fCi/m3)				
Analyte	Total Counts	Qty. of Detects	Average Concentration	Min MDL	Max Detected Concentration	Total Counts	Qty. of Detects	Average Concentration	Min MDL	Max Detected Concentration
ALPHA, GROSS	96	16	3.84	1.44	46.83	81	26	3.40	1.55	6.37
BETA, GROSS	96	86	12.49	1.74	102.24	81	73	13.53	2.46	29.28
RADIUM-226	96	5	0.35	0.1	0.86	81	5	0.33	0.13	0.92
RADIUM-228	96	2	1.44	0.52	1.32	81	4	1.27	0.79	2.82
THORIUM-228	96	5	0.23	0.05	0.86	81	10	0.22	0.05	0.18
THORIUM-230	96	27	0.21	0.03	1.58	81	25	0.19	0.04	0.28
THORIUM-232	96	3	0.12	0.02	0.66	81	4	0.12	0.04	0.16
URANIUM-234	96	2	0.37	0.09	6.51	81	10	0.28	0.11	0.60
URANIUM-235	96	0	N/A	0.09	N/A	81	0	N/A	0.12	N/A
URANIUM-238	96	1	0.32	0.13	2.98	81	4	0.30	0.12	0.79

5.2 Meteorological Data

Meteorological data generated during 2Q 2006 consisted of precipitation, temperature, relative humidity, barometric pressure, solar radiation, wind speed, and wind direction. These meteorological parameters are summarized in Table 13 and discussed below.

5.2.1 Precipitation

Total monthly precipitation measured by the meteorological station was approximately 1.42 inches in April, 0.03 inches in May, and zero inches in June.

5.2.2 Temperature

The average, minimum, and maximum temperatures for each month of 2Q 2006 are presented in Table 13. The average monthly temperature measured by the meteorological station increased from approximately 50°F in April to 72°F in June.

5.2.3 Relative Humidity

The average, minimum, and maximum relative humidity for each month of 2Q 2006 are presented in Table 13. The average monthly relative humidity measured by the meteorological station decreased from approximately 50 percent in April to approximately 28 percent in June.

5.2.4 Barometric Pressure

The average, minimum, and maximum barometric pressures for each month of 2Q 2006 are presented in Table 13. The average monthly barometric pressure measured by the meteorological station increased slightly from approximately 864 mBar in April to approximately 867 mBar in June.

5.2.5 Solar Radiation

Total monthly solar radiation measured by the meteorological station increased from approximately 658,000 kJ/m^2 in April to approximately 845,000 kJ/m^2 in June.

5.2.6 Wind Speed

Wind speed measured by the meteorological station during 2Q 2006 ranged from approximately zero to 41 mph (20 m/s). Wind speed for each monitoring event is provided in Figure 4. The daily average, minimum, maximum, and standard deviation of all wind speed observations for each monitoring day are indicated on the chart. The highest average wind speeds occurred during Event 75 on April 17, 2006 and Event 83 on June 4, 2006.

Wind speed frequency distribution is presented in Figure 5. The wind speed measurements have been grouped according to general wind speed classes [e.g., 5 – 10 mph (2.2 – 4.5 m/s)]. The frequency of wind speed measurements is indicated for each wind speed class. The frequency

distribution of wind speeds during 2Q 2006 indicated the majority (55 percent) of measurements were 5 mph (2.2 m/s) or less. Approximately 25 percent of the total measurements were between 5 – 10 mph (2.2 – 4.2 m/s). Maximum wind speeds (greater than 20 mph or 8.9 m/s) during 2Q 2006 represented 4.4 percent of the measurements.

5.2.7 Wind Direction

Wind direction measurements collected over a period of time are best summarized by wind rose plots. These plots group wind direction measurements into ranges of degrees (0 to 22.5, 22.5 to 45, etc.) and represents the ranges by a vector on a radial chart. The length of the vector is determined by the number of measurements in that range compared to the total number of measurements. In addition, a wind rose plot may provide information on wind speed by coloring the vectors that correspond to wind speed ranges. Wind rose plots were created using Rose Works Joint Frequency Distribution Program software by UAI Environmental to display both wind direction and wind speed. Note that this is different software than used in previous quarterly monitoring reports for the Yerington Mine and the plots look slightly different. Rose Works was used because it accepts raw data generated from the site meteorological station without the need to average or round values for pre-processing input files.

Wind rose plots are provided in Appendix K for a variety of time periods described below.

- 2Q 2006 (April 1 to June 30, 2006; 8,736 observations)
- Each month in 2Q 2006 (April, May, and June; 2,880, 2,976, and 2,880 observations, respectively)
- Each monitoring event in 2Q 2006 (Events 74 through 87; 96 observations each)

As shown on the wind rose plot for 2Q 2006 and in the wind rose plots for each month in 2Q 2006, the predominant wind directions were from the southwest to the northeast and from the northeast to the southwest. Individual wind rose plots for events during 2Q 2006 indicate that wind direction can be quite different from one event to the next.

The average PM_{10} and TSP concentrations measured during 2Q 2006 at each monitoring location are presented on Figures 6 and 7, respectively. Note that monitoring locations that are to the

south and southwest (AM-1 through AM-3) have average particulate matter concentrations that are generally less than those measured at the locations that are to the north and northwest (AM-4 through AM-6).

SECTION 6.0
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